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PACIFIC OCEANIC FISHERY
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United States Department of the Interior, J. A. Krug, Secretary
Fish and Wildlife Service, Albert M. Day, Director

Fishery Leaflet 267

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SAO PAULO FISHING INDUSTRY 1/

By John F. Root, Vice Consul

Fishing as an industry in the State of Sao Paulo is restricted mainly to inshore fishing in the coastal waters. Individual professional fishermen or small associations account for most of the catch, which goes primarily to the city of Sao Paulo and other markets within the State.

Many types of fish abound in the waters off the coast and a manner of organization for exploiting the opportunities offered has gradually been evolved. But the fishing fleet is much too small and the facilities for receiving and distributing the fish much too inadequate for a full realization of the possibilities. By the best current standards of efficiency, quantity of production and hygiene, the Sao Paulo fishing industry continues in a relatively backward condition.

With 2,007 professional fishermen and a fleet of motor-driven fishing vessels numbering 111, the industry brought to the Sao Paulo markets in 1945 an officially-estimated 10,227,988 kilograms of fish valued at 16,033,713 cruzeiros (about US$801,686). The bulk of this catch was consumed promptly as fresh fish. The preserving and canning in Sao Paulo of seafood (except sardines) and by-products is in only the incipient stages of development.

Where fish is concerned, the State of Sao Paulo would seem to offer all of the best features of a consuming market, especially in its capital city of nearly 2 million inhabitants and other urban concentrations: A population predominantly Catholic, made up largely of Portuguese, Italian, Spanish and other maritime elements; a low standard of living which obliges most families to apply from 30 to at least 50 per cent of the family budget to food; and, at the present time, high prices for meat and other foodstuffs.

Indeed, the supply of fish from local sources far from satisfies local requirements. Dried, canned and frozen fish, with codfish and sardines the principal items, is now being imported from Portugal, Norway, the United States and other countries at the rate of 2,000,000 kilograms annually, while imports of fish from Rio de Janeiro, Rio Grande do Sul and other States of Brazil in 1945, the latest year for which data is available, exceeded 3,000,000 kilograms.

Since 1939, fishing in Brazil has been under the control of the Fish and Game Division, Department of Animal Production, of the Ministry of Agriculture. In Sao Paulo, the governmental organization parallels exactly that of the Federal Government. The industry is presently regulated by the Code of Fishing set down in Decree-law No. 794 of October 19, 1938

1/ American Consulate General Report No. 131, Sao Paulo, Brazil, August 26, 1947

The government took a special interest during wartime in "rationalizing" the industry and stepping up production. Considering that neither the fisherman nor the consumer was properly protected in a system whereby intermediaries bought the catch at barter prices and sold to distributors at auction, the government set up an executive Commission on Fishing (Comissao Executiva da Pesca), which in the State of Sao Paulo gave a concession for the purchase and distribution of all fish delivered to the ports to a private organization operating under official supervision. Fishermen were assured a stable price for their product and the fish were sold directly to the public through the retail outlets of the concessionaire.

But this experiment was short-livdd. With the change in politics in 1945, the Executive Commission was dissolved and distribution reverted to the old free market system. By certain professional assistants in the State Ministry of Agriculture this is considered a lamentable step backward. They view with misgiving the advantageous position felt to be held by the intermediaries and the uncertainty which individual fishermen face in disposing of their hauls. They point to increased production during the period when the commerce was under government control and to diminished production since.

The concessionaire under the government system is now operating as a private cooperative. It currently distributes about 35 per cent of all fish caught in the coastal waters, purchasing from groups of fishermen associated with the cooperative and selling through 27 modern outlets in the city of Sao Paulo.

Through its Institute de Pesca Maritima and marine biological station in Santos, Sao Paulo has become a pioneer in South America in research on the biological and commercial aspects of maritime fishing. The Institute also supervises a series of courses for the training of professional fishermen.

There has been little organized commercialization of fresh-water fishing. The rivers of the interior contain many varieties of fish and some of the choicer specimens can be found for sale from time to time in Sao Paulo markets. But the difficulties of transportation impose a formidable handicap. Angling for fresh-water fish in the streams and rivers of the State is a very popular sport and subsistence fishing is carried on by the poorer classes in the interior as well as along the coast.

LOCATION

Many of the most prolific areas off the Sao Paulo coast have not yet been touched. Fishing is rarely carried on more than 5 miles from the shore or at a greater depth than 20 meters, which is about the present limit of the drag nets used. Development of these areas awaits more powerful fishing boats and more modern equipment.

The coastal area now exploited is generally divided into three sectors, as follows:

SECTOR	ZONES
Northern	Sao Sebastiao
	Ubatuba
	Ilha Grande

SECTOR	ZONES
Central	Pertioga
	Itanhaen
	Santos
	Peruibe
Southern	Cananéa
	Iguape
	Other zones

The relative importance of each of these sectors can be seen in the figures for production in 1944:

SECTOR	KILOGRAMS	PER CENT	CRUZEIROS	PER CENT
Northern	8,063,331	85.5	9,997,596	73.2
Central	490,885	5.2	1,579,010	11.6
Southern	870,224	9.3	2,046,115	15.2
Total	9,424,440	100.0	13,622,721	100.0

The predominant position of the Northern Sector is accounted for almost entirely by the catch of the sardine known as "sardinhaverdadeira-grande", the major supply of which comes from the zone around Ilha Grande. This fish is by far the most abundant of all species in Sao Paulo waters and the most commonly consumed in Sao Paulo households.

The fish caught in the Central and Southern Sectors are, as their considerably greater value per weight indicates, of a more plebeian rank in the piscatorial world.

EMPLOYMENT

Recent years have seen a decided drop in the number of professional fishermen operating as individuals and a comparable increase in the number working as crews in the motorized fleet, which already produces all but a small fraction of the total outturn of fish.

This change is seen in the following data on professional fishermen licensed in the State:

	1943	1944	1945
Fishermen on motor vessels	387	397	970
Individual fishermen	1,361	1,404	1,037
Total	1,748	1,801	2,007

Fishermen operate as enterprisers rather than as salaried workmen. When fishing as part of a group, each man receives a share of the money realized in each venture proportionate to his skill and assignment.

Hours of labor and working conditions are left largely uncontrolled.

FISHING VESSELS

In 1943 the State of Sao Paulo had 88 registered fishing vessels, 92 in 1944, and 111 in 1945. Practically all of these vessels are built of wood and driven by motor. It is estimated that this motorized fleet brings in more than 90 per cent of the total catch of fish.

Horsepower of the vessels varies from 10 to 70, averaging about 28, and length is a minimum of 7 meters and a maximum of 15, averaging about 11.5. Dead weight runs from 3 to 50 metric tons, averaging about 10, and cargo capacity varies from 1 to 27 tons, averaging about 6. These boats carry a crew of from 2 to 10 men.

Generally speaking, vessels are not assigned to any special fishing activities but engage in all types of operations, depending on the season, the market and other factors. During the war the few trawlers that were operating off the coast turned to the more remunerative task of hauling inter-coastal trade.

The boats lack modern equipment and have no mechanical refrigeration. Crushed ice brought from shore is used to keep the fish fresh until the return to port.

The fishing fleet is considered entirely inadequate to achieve the full possibilities of the industry.

FISHING METHODS EMPLOYED

The drag net and the net trap are the most popular gear used for catching fish. Line fishing and other methods are limited largely to the activities of small fishermen along the coast.

The rede de traineira, a long rectangular net fastened to one vessel and drawn by another in a great underwater circle about the shoal of fish to be captured, has been found especially adapted to the sardine fishing in the Northern Sector. For virtually the entire year, dozens of barks are concentrated in the area from Sao Sebastiao north to the bay of Ilha Grande using this method to pursue the innumerable sardines inhabiting those waters.

The cerco flutuante is a net trap introduced by the Japanese fishermen who live along the Sao Paulo coast. Since it is a type of trap best suited for use in bays and inlets it is found in greatest numbers along the heavily indented coastline of the Northern Sector. The trap is in two parts. One has the shape of a pan and serves as the trap. The other is a rectangular net stretched from the shore and acting as a barrier to deflect the schools of fish moving along the shore into the funnel-like entrance of the trap. The types of fish most frequently brought in with net are those which pass, individually or in groups, in migratory movements close to the shoreline and which are found in the "meia agua" (half water), that is, halfway down.

The principal locale for fishing in this manner is the Island of Sao Sebastiao and the coast from Togue-Togue to Picinguaba.

The arrastas de parelha is a drag net commonly employed by the numerous craft, which ply the waters of the Southern Sector between the Ilha de Guarau and the Ararapira bar. The net has much the appearance of a sack or a deep

sleeve closed at one end. Long cords attached to either side of the net are pulled by two boats proceeding on parallel courses at identical speeds.

During the hot months of the year this type of fishing is a very productive occupation, for it is used to capture many of the varieties most valued on the markets. But the catch falls off heavily in the winter.

A small-sized parelha is used to gather the shrimp known as "carmarao-sete-barbas", which abounds in the waters near Santos.

Rede de espera and rede de emalhar are names given to various kinds of rectangular nets which are suspended from fishing vessels or sunk by weights across the area through which shoals of fish are expected to pass. The fish are caught in the meshes and prevented by their heads or gills from escaping. The nets are pulled up periodically and the fish withdrawn.

The tarrafa is a casting net, conical in shape and with much the appearance of a large skirt, with heavy folds on the inside in which the fish are caught as the net is withdrawn. The net is thrown from the vessel so that it lands fully opened on the water. As it falls over the school of fish, the bottom is drawn tight.

The arrastao da praia is a drag net thrown from the beach. It is rectangular in form, with a length of about 200 meters. It is thrown out into the water in a great arc and is slowly pulled to shore by two groups of men each holding one end of the net.

The linha de fundo is a baited hand line dropped almost to the ocean bed, while the corrico is a hand line trawled slowly near the surface. The espinhel is a line to which a series of fish hooks is attached and which is then floated laterally near the ocean bed. Two buoys on the surface keep the line from sinking and indicate when the bait has been taken and two weights on the bottom keep the line spread out and held in position.

Fishing by line, of secondary importance, is done mainly on the islands and reefs in the chain known as the "outer islands" (Alcatrazes, Queimada Grande, Queimada Pequena and Lage de Santos).

The beach drag net, fishing by line and stationary nets are employed principally by the small fishermen grouped in little nuclei along the coast and fishing either from shore or in small boats moved by sail or oar. This group is made up of several hundred fishermen but their production is small in comparison with the returns of the motorized fleet.

Special types of casting and drag nets are used to haul in the shrimp known as "camarao-legitimo" which is found in considerable quantities in the areas near Santos and near Canânea, where the Federal Government has established a large fish depot.

In the winter, fishing for the specie known as "tainha" becomes an important activity in the river estuaries, especially those of the Guaratuba and the Itaguare where the capture is made with circular nets of bamboo. When the shoals of fish, migrating in search of fresh water, approach the coast, a special type of drag net, the rede de tainha, is also used with outstanding success, sometimes capturing more than a thousand fish at one haul.

Along the banks of the river known as Ribeira de Iguape, in the Southern Sector, a profitable industry has been developed in fishing for the "manjuba", a type of anchovy, which in migration ascends the river as far as Xiririca. In the migratory season several hundred fishermen work continually along the stream hauling in a great volume of fish with special nets.

SPECIES

Preliminary studies of the maritime fauna along the litoral of the State of Sao Paulo indicate that there are about 240 species of more or less economic value. To date, however, not more than 120 figure habitually in the market statistics. The principal types of fish caught and their scientific names are as follows:

LOCAL NAME	SCIENTIFIC NAME
Sardinha- verdadeira 1/	Sardinella aurita (Cuv. & Val.)
Corvina	Micropogon opercularis, Micropogon furnieri and Micropogon undulatus.
Pescadinha	Cynoscion leiarchus
Oveva	Larimus breviceps
Cacao (shark)	Carcharinus limbatus
Camarao (shrimp)	Xyphopenaeus Kroyeri, Penaeus setiferus and Penseus brasiliensis.
Tainha	Mugil platanus and Mugil brasiliensis
Galo	Selene vomer
Cangoá	Bairdiella sciaenideae
Goete	Cynoscion archoscion petranus.
Manjuba	Anchoviella hubbai and Anchoviella brasiliensis

The classification "mistura"(mixture, which is an important entry in the production statistics, covers a variety of fish of small size, among which the most important is the "roncador" (Conodon nobilis).

FISH CATCH, 1937 TO DATE:

No accurate data on fish production exists prior to the organization of the Comissao Executive da Pesca in 1943, but it is estimated that up to that time about 300 metric tons of fish monthly were received in the Sao Paulo markets (from Rio as well as Santos).

1/ The sardinha-verdadeira regularly amounts by weight to more than half the total of fish caught.

Production by weight and value in 1944, 1945 and the first four months of 1946 follow:

PRODUCTION BY WEIGHT IN KILOGRAMS

SPECIE	1944	1945	JAN.-APRIL 1946
Cacao	216,913.400	257,777.700	38,849.700
Camarao, including	302,556.600	334,906.050	114,599.050
Camarao-sete-barbas	(169,159.000)	(232,013.800)	(109,026.300)
Cangoa	39,893.500	164,832.500	64,599.300
Corvina, including	348,661.100	258,118.150	158,918.900
Corvina de rede	(348,513.200)	(239,773.700)	(139,017.700)
Galo	128,063.600	86,881.000	2,992.000
Goete	291,891.400	261,817.200	64,328.500
Manjuba	5,737.300	11,750.000	---
Mistura de la	384,241.700	826,100.700	136,626.500
Oveva	238,375.900	279,702.000	28,307.000
Pescadinha, including	349,442.050	367,739.500	80,858.300
Pescadinha de alto mar	(322,064.850)	(348,785.100)	(78,949.900)
Sardinha, including	5,885,257.650	6,509,090.300	1,238,226.000
Sardinha verdedeira grande	(5,859,615.650)	(6,467,929.300)	(1,234,188.000)
Tainha	249,713.100	72,144.300	402.000
Others	1,403,647.800	789,817.750	201,155.900
Total	9,424,440.100	10,220,677.150	2,129,863.150
Shark liver oil	Unknown	7,310.500	2,086.000
Grand Total	---	10,227,987.650	2,131,949.150

PRODUCTION BY VALUE IN CRUZEIROS (ONE CRUZEIRO EQUALS APPROXIMATELY U.S. 5.3 CENTS)

SPECIE	1944	1945	JAN.-APRIL 1946
Cacao	443,796.60	754,593.10	126,582.20
Camarao, including	1,070,025.10	1,024,955.00	409,271.70
Camarao-sete-barbas	(338,728.40)	(440,712.20)	(337,954.40)
Cangoa	31,788.90	132,569.80	52,007.50
Corvina, including	792,788.40	917,424.90	604,211.40
Corvina de rede	(792,306.50)	(864,964.60)	(553,941.50)
Galo	154,424.60	161,850.80	5,200.60
Goete	796,614.30	726,615.20	188,029.00
Manjuba	4,919.80	9,531.00	---
Mistura de la	605,641.70	1,635,854.70	266,304.70

PRODUCTION BY VALUE IN CRUZEIROS (Cont.)

SPECIE	1944	1945	JAN.-APRIL 1946
Oveva	496,502.40	737,889.30	81,061.90
Pescadinha, including	1,325,865.40	1,748,432.00	471,844.40
Pescadinha de alto mar	(1,222,482.40)	(1,648,531.00)	(461,389.60)
Sardinha, including	5,156,571.30	5,821,693.90	1,216,701.60
Sardinha verdedeira grande	(5,122,844.90)	(5,803,272.60)	(1,213,138.60)
Tainha	734,244.50	238,716.30	1,588.20
Others	2,009,538.40	2,108,966.30	656,353.60
Total	13,622,721.40	16,019,092.30	4,079,156.90
Grand Total	Unknown	14,621.00	4,175.70
Grand Total	---	16,033,713.30	4,083,332.60

These figures refer to the production of fresh fish for immediate consumption and do not take into consideration the quantities preserved, salted or otherwise processed. In 1944, fish diverted to these ends amounted by weight to 1,451,486 kilograms.

Among the crustaceans and mollusks, shrimp are the principal species caught. Oysters, lobsters and clams are taken in only nominal quantities and are uncommon items in Sao Paulo diets.

The popularity of the sardine is due largely to its abundance and relative cheapness, which makes it the leading seafood of the lower classes. It is used to a considerable extent for canning and salting.

The value of production in the statistics above is the sum paid to the fishermen on the delivery of the catch. The returns from sales are much higher, as can be gathered from the chart below showing a comparison of monthly production and monthly sales in 1944. The excess weight produced over that consumed represents in addition to stocks carried over, fish condemned at inspection and other losses resulting from such factors as gutting and dehydration.

MONTHS	PRODUCTION KILOGRAMS	PRODUCTION CRUZEIROS	SALES KILOGRAMS	SALES CRUZEIROS
January	600,688.300	958,236.40	593,009.510	1,775,856.80
February	684,133.550	962,160.70	534,244.090	1,690,229.10
March	645,564.400	966,064.30	681,455.660	2,137,927.60
April	694,629.900	873,018.60	802,182.340	2,591,038.50
May	939,223.100	1,069,829.30	844,248.840	2,484,103.40
June	978,907.300	1,188,085.60	909,985.750	2,718,287.40
July	768,495.700	1,208,690.20	766,096.250	2,794,760.50
August	1,060,639.000	1,354,149.50	880,859.610	2,894,164.20
September	866,813.950	1,237,856.40	970,605.790	2,956,792.40
October	903,195.900	1,623,978.50	851,775.820	3,163,976.80
November	583,300.400	1,032,017.40	717,299.800	2,805,199.90
December	698,842.600	1,178,634.50	713,916.870	2,854,745.50
Total	9,424,440.100	13,622,721.40	9,265,610.330	30,866,782.10

PRODUCTION AND METHODS OF PROCESSING

The fishing boats discharge their cargo at Santos or at various smaller ports along the coast. Fish not consumed in the locality of the out ports is subsequently brought to Santos for distribution.

The fish is removed from the vessels in baskets and washed in fresh water. After weighing and classifying, it is placed in one of two standard-sized boxes holding either 30 or 60 kilograms of fish, with sufficient space left for the necessary ice. The boxes are of the same length and width, differing only in height. The 30-kilogram boxes are used for the smaller fish, such as sardines and shrimp.

Fish not immediately shipped from Santos is put in one of 3 refrigerated chambers for later distribution. The largest can hold about 250,000 kilograms of fish at a temperature of minus 15° Centigrade. The other 2 deposits hold only about 35,000 kilograms of fish at a temperature of minus 2° to minus 6° Centigrade.

The fish is generally transported by truck to the city of São Paulo during the night, each vehicle hauling an average of 50 boxes per trip and making about 4 trips nightly. In the city, the fish is distributed to the fish markets by small delivery trucks. Fish going to the interior of the State is usually transported specially packed in ice by railroad. Besides the sale at fish markets, fish are also distributed to the public by means of hand carts pushed along the streets. Indeed, save for the city of Sao Paulo and a few of the larger towns, very few communities have fish markets.

The reception and handling of fish in the ports and the markets, in spite of improvements in recent years and with the exception of the modern markets to be found in the capital, is still very rudimentary, especially at the ports, with standards of sanitation well below those effective in the United States.

The industrial processing of fish is carried out by two kinds of industry, the "fabricas", or factories, which preserve and can fish; and the "salgas", or plants for curing and salting.

By a Federal Decree-law (No. 3688), promulgated early in 1939 to regulate the so-called "industrialization" of fish, especially with reference to the hygienical conditions enforced, the "fabrica" is considered "the organization which possesses the equipment and technical requisites for the preparation of preserved products by heat, and for their complete sterilization." A "salga" was described as "the organization intended exclusively for the preparation of salted, pressed, dried and smoked products."

The preserving agent used for canned fish, of which the sardine and the anchovy are the most common, is usually either peanut oil or tomato extract. The cans are hermetically sealed and cooked in autoclaves.

The salting process is somewhat more rudimentary. The fish is washed by immersion and stored with alternate layers of salt in large cement tanks. The proportion of salt to fish is about 25 per cent.

After 24 hours, the fish is withdrawn and placed in trays for drying in the sun or in special hot-houses. Drying requires a further 18 to 24 hours. Then the fish is placed in wooden boxes, which generally hold about 20 kilograms of fish each. Fish thus processed are considered fit for consumption until about 3 months after the processing date.

The production of dried or preserved fish in 1944 is shown in the following table:

	WEIGHT IN KILOGRAMS	PER CENT OF TOTAL
Canned, preserved fish	24,012	2.2
Dried fish	790,958	71.1
Salted fish	117,545	10.5
Pressed fish	141,264	12.7
Pickled fish	38,903	3.4
Total	1,112,682	100.00

PRODUCTION OF BY-PRODUCTS

The production of fish by-products is negligible. Shark oil is produced at the rate of about 10 tons monthly. This represents the output of two factories in Sao Paulo and one in the State of Santa Catarina, whose production is sold to Sao Paulo consumers. Because of its low vitamin content, the oil is generally not suitable for medicinal purposes but is used as industrial oil. A small quantity of oil concentrate is put into certain pharmaceutical preparations.

CONSUMPTION

The consumption pattern closely parallels production and imports, for very little fish produced locally leaves the State. The sardine is the most common domestic type consumed, while the pescadinha is especially favored by those who can afford the higher-priced fish.

The dried codfish which is so popular in the local diet is imported from Norway and other foreign countries. Split open and flattened, and dried so that it is hard and white, this fish is to be seen hanging in virtually every corner grocery store, in which it suffuses a very distinctive and to the unaccustomed nostrils a decidedly disagreeable aroma.

IMPORTS AND EXPORTS

Dried codfish from Norway and canned sardines from Portugal are the principal items entering into the imports of fish through Santos given below:

1945

	WEIGHT IN KILOGRAMS
Dried salted fish	509,806
Canned fish	69,323
Frozen fish	98,457

1946, January - August

	WEIGHT IN KILOGRAMS
Dried salted fish	1,491,146
Canned fish	282,601
Frozen fish	32,811

Canada, the United States, Argentina, Chile and Spain also exported sizeable shipments of fish to Santos in the above years.

Unofficial export data for Santos show that 46,605 kilograms of canned fish were shipped from Sao Paulo through that port in 1946.

Statistics published by the State of Sao Paulo show the following imports of fish from other States of Brazil through Santos in 1945:

	WEIGHT IN KILOGRAMS	VALUE IN CRUZEIROS
Fish dried, salted, otherwise preserved, and fish extracts	1,392,401	16,301,239
Unspecified	1,941,070	20,368,879
Total	3,333,471	36,670,118

Exports through Santos to other States of Brazil in 1945, were, according to the same set of statistics:

	WEIGHT IN KILOGRAMS	VALUE IN CRUZEIROS
Fish dried, salted, otherwise preserved, and fish extracts	82,030	83,903
Unspecified	19,039	305,417
Total	101,069	389,320

Rio de Janeiro, Rio Grande do Sul and Parana were the principal exporting States and it is believed that most of Sao Paulo's shipments went to Rio de Janeiro. Some exchange of fish by rail takes place between Sao Paulo and Rio de Janeiro but the quantity is unknown.

Several years ago Sao Paulo started to develop an industry for the tanning of the skins of the fish known as "peixe-boi" (ox fish), which was brought from the region of the Amazon River. Although the leather produced was highly touted as a substitute for many kinds of good quality animal leather, technical

difficulties of tanning among others has since caused abandonment of the local industry. Small quantities of tanned leather are still imported from the Amazon area.

Following are import data for Santos on fish oils brought into Sao Paulo from overseas:

1945

	COUNTRY OF ORIGIN	WEIGHT IN KILOGRAMS
Shark liver oil	Argentina	115
Cod liver oil	U.S.A.	83,371
Other fish oil	U.S.A.	212

1946, January-June

Cod liver oil	U.S.A.	438
Cod liver oil	Other than U.S.A.	3,708
Salmon oil	U.S.A.	1,245

PRICES

The price of fresh fish retailed varies widely with the season and the quantities supplied. Today retail prices for types of fish common on the market are as follows:

FISH	PRICE PER KILOGRAM IN CRUZEIROS (ONE CRUZEIRO EQUALS APPROXIMATELY U.S. 5.3 CENTS)
Sardines	4.00- 5.00
Corvina	10.00
Tainha	14.00
Cacao	12.00
Shrimp	
small	5.00
medium	15.00
large	30.00
Pescadinha	20.00
Codfish (imported)	16.00-24.00-40.00

Prices of sardines and other canned fish are:

	CRUZEIROS	WEIGHT PER CAN
Sardines in cans		
domestic	4.50	250 grams
imported	8.00	250 grams
Calamary (imported)	10.00	500 grams
Anchovies (imported)	6.00	100 grams

FISHERY REGULATIONS, POLICIES AND INTERNAL TRADE PATTERN

The industry is regulated by the Code of Fishing of 1938. Otherwise, the industry is generally free from official control. The principal marketing arrangement in effect is the one already described, that in which a Sao Paulo cooperative buys from affiliated fishermen at established prices and sells to consumers through its own retail outlets, accounting for about 35 per cent of all sales. The remaining commerce in fish operates as a free market, although proponents of government control think the distributors are in an advantageous position.

FISHERY RESEARCH

Although the Institute of Maritime Fishing in Santos is believed to be the first of its kind in South America, research is handicapped by the lack of trained personnel and adequate resources. The institute was established in 1935 to supervise the various schools teaching the modern science of fishing and to carry on research in marine biology as well as in the technology related to the commercial exploitation of the fishing industry.

A Section of Marine Fauna (Seccao da Fauna Maritima) was set up in the State Ministry of Agriculture a few years ago and began cataloguing the various species of fish in the Sao Paulo coastal waters in accordance with a plan drawn up for all of Brazil by Professor George S. Myers of Stanford University (which was to receive a specimen of each type of fish studied).

In its preliminary study the Seccao da Fauna Maritima classified 13 orders, 20 sub-orders and 92 families, with 283 species in all. As elsewhere in the world, the largest group of fish is represented by the order Aconthopterii, with 17 sub-orders, 56 families and about 183 species.

The sub-class Euselachi of the class Elasmobranchii is represented by 4 orders, 18 families and 42 species (19 of which are sharks, squalus and various rays) already classified. The sub-class Neopterigii of the class Actinopterigii is represented by 9 orders, 20 sub-orders, 74 families and about 241 species.

As previously noted, it was determined that the Sao Paulo waters contain 240 species of more or less commercial value, all of them fit for human consumption and many suitable for industrial purposes. Notwithstanding, not more than 120 species are regularly found in local markets.

The inventory showed that almost 49 per cent of the species found anywhere in Brazilian waters may be encountered off the Sao Paulo coast.

SUMMARY

The consumption of fish in Sao Paulo now runs at the rate of about 15,000 metric tons annually. It is believed that the effective demand could be increased appreciably if prices were satisfactory and facilities for distribution improved. Fleet facilities and fishing equipment are entirely inadequate for a large and prosperous industry. Distribution is made by antiquated and in many cases unsanitary methods. Lack of proper refrigeration justifies suspicion as to the freshness of fish sold through retail outlets, although the city of Sao Paulo has a number of relatively modern markets. The industry has certainly made only a beginning on its inherent possibilities.

THE FISHING INDUSTRY IN PARANÁ

Little information is available on the fishing industry in the other States of the Sao Paulo consular district. Coastal fishing is carried on off the coasts of Parana and Santa Catarina but on a much smaller scale than in Sao Paulo and mainly by individual fishermen in small sail boats. Fish caught are consumed primarily by the populations living along the coast, although Santos received a small amount of fish from Paraná.

Data received from the State Department of Statistics in Paraná shows the number of fishing vessels registered in that State, the number of licensed fishermen and the weight and value of fish caught:

NUMBER OF FISHING VESSELS, PARANÁ	1944	1945	1946
Sail boats	1,193	1,139	1,150
Motor boats	5	4	4
Whalers	4	4	4
Total	1,202	1,147	1,158

Note: At one time Southern Brazil was one of the principal areas from which whaling in the South Atlantic was conducted. The industry was largely abandoned for lack of modern equipment.

	1944	1945	1946
Number of fishermen, Paraná	2,464	2,128	1,809

TOTAL PRODUCTION OF FISH, PARANÁ	1944	1945	1946
Weight in kilograms	457,809	536,769	566,649
Value in cruzeiros	474,746.00	695,146.00	756,300.00

PRODUCTION BY PRINCIPAL SPECIES

SPECIES	1944	1945	1946
Shrimp	99,113	129,691	190,132
Shark	80,800	87,345	30,500
Tainha	74,269	82,465	69,122
Bagre 1/	40,275	75,571	18,230
Pescadinha	28,636	30,242	19,713
Sardine	22,817	39,542	45,925
Pescada	17,122	15,503	54,308
Others	94,777	76,410	139,619
Total	457,809	536,769	566,649

1/ Tachysurus sp.

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